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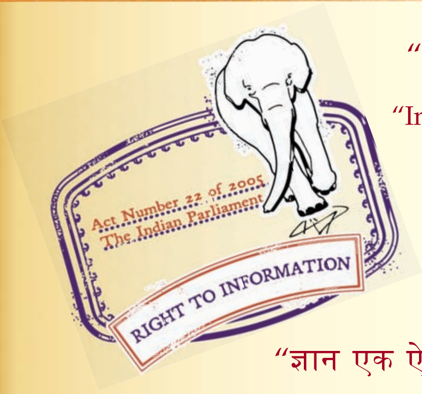

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Indian Standard

STABILITY TESTS FOR SIDE LOADER TRUCKS

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STABILITY TESTS FOR SIDE LOADER TRUCKS

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Indian Standard
STABILITY TESTS FOR SIDE LOADER TRUCKS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 January 1979, after the draft finalized by the Industrial Trucks Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 This standard covers tests to determine the stability of side loader trucks under various normal operational conditions, namely, travelling on level grounds with the load in the lower position and stacking with mast vertical.

0.3 When operational conditions differ from the normal conditions given in **0.2** the stability test shall be as agreed to between the manufacturer and the purchaser.

0.4 In the preparation of this standard assistance has been derived from ANSI B56.1-1975. Power industrial trucks standard for safety requirements relating to elements of design, operation and maintenance of powered industrial trucks, issued by the American National Standards Institute (ANSI), USA.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the tests for verification of stability of side loader trucks for rated capacity. These are type tests.

1.2 This standard applies to single side loader trucks with tilting or non-tilting masts or fork arms and articulated or non-articulated steering suspension. It also applies to trucks operating under the same conditions, but having ancillary attachment other than fork arms.

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*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 4660-1977* and IS : 7570-1975† shall apply.

3. CONDITIONS OF VALIDITY

3.1 Normal Operating Conditions — The tests covered in this standard ensure that the type of truck under test has satisfactory stability for operation under general operating conditions as given below:

- a) Operating on substantially level surfaces;
- b) Travelling with the load in the lowered position; and
- c) Stacking with the mast substantially vertical.

3.2 Other Conditions — When operating conditions differ from the conditions defined in **3.1** (for example when forward tilt is required during stacking with full load and full elevation), it is necessary to use either of the following:

- a) A truck with a higher capacity, or
- b) A truck having design modifications which are agreed between the manufacturer and the purchaser.

3.3 Complementary Tests — In the case where tests other than the tests specified in Table 1 are necessary, the details shall be as agreed between the purchaser and the manufacturer.

4. TESTS

4.0 The tests and the conditions prescribed for each test are given in Table 1.

4.1 Conditions for Carrying Out the Tests

4.1.1 The stability of these trucks shall be verified using a platform which may be tilted about one side to slope values given in Table 1. However for tests S-2, S-2A, S-4 and S-4A slope values shall be determined from Fig. 1.

4.1.2 The test shall be carried out on an operational truck but without an operator.

4.1.3 *Test Load* — The test load shall be equivalent to an unrestrained homogeneous cube, the dimension of which is twice the load centre and the mass of which is equal to the rated capacity of the truck.

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*Glossary of terms relating to powered industrial trucks (*second revision*).

†Glossary of terms relating to fork arms and attachments of fork lift trucks.

TABLE 1 SUMMARY OF TESTS FOR STABILITY — SINGLE SIDE LOADER TRUCKS

(*Clauses* 4.0, 4.1.1 *and* 4.2.1)

TEST	TESTS FOR	TRUCK POSITION ON PLATFORM	FORK HEIGHT	UNLOADED OR LOADED	LOAD CENTRE (LC)	CARRIAGE EXTENDED OR RETRACTED	MAST FORK OR LOAD BED TILT	PLATFORM SLOPE VALUES
S-1*	Lateral stacking	Fig. 2 or 3	Maximum elevation	Loaded	*See* Note 1	Extended	Vertical	4%
S-2	Lateral travelling	Fig. 2 or 3	Load bed height	Loaded	*See* Note 1	Retracted	Vertical	Fig. 1
S-2A	Lateral travelling	Fig. 4 or 5	Load bed height	Loaded	*See* Note 2	Retracted	Vertical	Fig. 1
S-3*	Lateral stacking	Fig. 4 or 5	Maximum elevation	Loaded	*See* Note 2	Retracted	Back tilt	8%
S-3A*	Lateral stacking	Fig. 4 or 5	Maximum elevation	No load	—	Retracted	Back tilt	8%
S-4	Lateral travelling	Fig. 2 or 3	(300 mm)	No load	—	Retracted	Vertical	Fig. 1
S-4A	Lateral travelling	Fig. 4 or 5	(300 mm)	No load	—	Retracted	Vertical	Fig. 1
S-5†	Longitudinal stacking	Fig. 6	Maximum elevation	Loaded	*See* Note 1	Retracted	Vertical	8%
S-6†	Longitudinal travelling	Fig. 6	Load bed height	No load	—	Retracted	Vertical	18%
S-7†	Lateral stacking	Fig. 2 or 3	Maximum elevation	Loaded	*See* Note 1	Retracted	Vertical	8%

NOTE 1 — Load centre (measured parallel to fork blade) divided by two.

NOTE 2 — Load centre (measured parallel to fork blade) divided by two, or 600 mm whichever is less.

*Tests must be conducted using jacks when they are part of the basic truck design.

†Where stability is obvious, test need not be conducted.

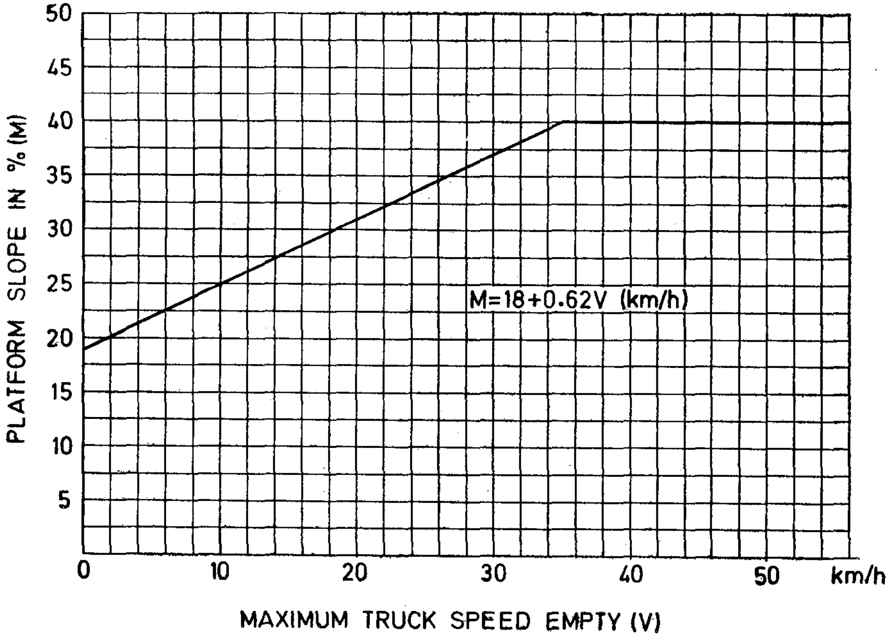

FIG. 1 LATERAL TRAVELLING STABILITY OF SINGLE SIDE LOADER TRUCKS

4.1.3.1 For trucks having lift heights more than 3300 mm, the test load shall be equal to the capacity corresponding to the lift height as stipulated by the truck manufacturer.

4.1.3.2 When the truck is equiped with an attachment, the test load shall represent the capacity of the truck and attachments combination.

4.1.4 *Position of Truck on Platform* — The truck under test shall be placed on the platform, which is initially horizontal, in positions described. The truck's position on the platform may be maintained by brakes or other similar means or by wheel chocks as long as they are not over 40 mm high and shaped so as not to improve the stability.

4.1.4.1 For tests S-1, S-2, S-4 and S-7, the truck shall be positioned on the platform with the forks pointing towards the axis of tilt (*AA*) and the axis of tilt parallel to: (a) the centre line of the wheels (*BB*) adjacent to the axis of tilt in the case of trucks having non-articulated steered axle (*see* Fig. 2), or (b) the line through the centre of the drive wheel adjacent to the axis of tilt and the centre of the steered axle in the case of trucks having articulated steered axle (*see* Fig. 3).

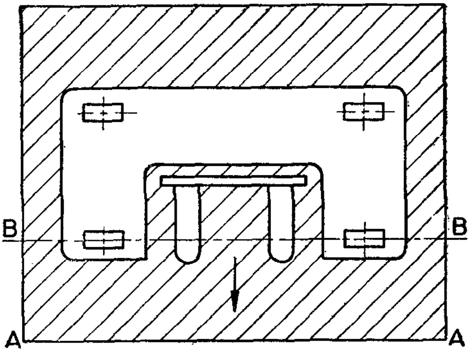

FIG. 2 POSITION OF TRUCK WITH NON-ARTICULATED STEERING SUSPENSION (FOR TESTS S-1, S-2, S-4 AND S-7)

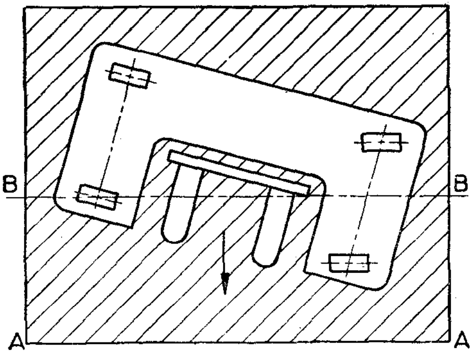

FIG. 3 POSITION OF TRUCK WITH ARTICULATED STEERING SUSPENSION (FOR TESTS S-1, S-2, S-4 AND S-7)

4.1.4.2 For tests S-2A, S-3, S-3A and S-4A, the truck shall be positioned on the platform with the forks pointing away from the axis of tilt (*AA*) and the axis of tilt parallel to : (a) the centre line of the wheels (*BB*) adjacent to the axis of tilt in the case of trucks with non-articulated steered axle (*see* Fig. 4), or (b) the line through the centre of drive wheel adjacent to the axis of tilt and the centre of the steered axle in the case of trucks with articulated steered axle (*see* Fig. 5).

4.1.4.3 For tests S-5 and S-6, the truck shall be positioned on the platform with the forks parallel to the axis of tilt (*AA*) and either the driven axle or steered axle adjacent to the axis of tilt (*AA*) as would make the truck less stable with the platform tilted (*see* Fig. 6).

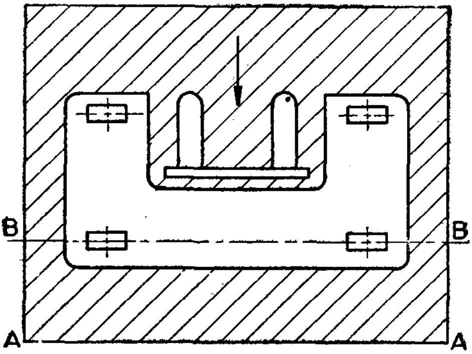

Fig. 4 Position of Truck with Non-articulated Steering Suspension (for Tests S-2A, S-3, S-3A and S-4A)

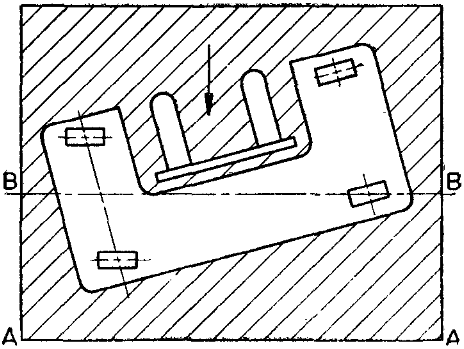

Fig. 5 Position of Truck with Articulated Steering Suspension (for Tests S-2A, S-3, S-3A and S-4A)

4.1.5 For any laden condition of the truck, the load shall be positioned on the forks in such a way that the centre of mass of test load remains on the longitudinal centre line of the lifting mechanism.

4.1.6 Where fork elevation of 300 mm is prescribed, the distance shall be measured from ground to the point of intersection of the front and load carrying surfaces of the fork.

4.1.7 When test load is carried on the bed of the truck, the deck if adjustable, shall be set level.

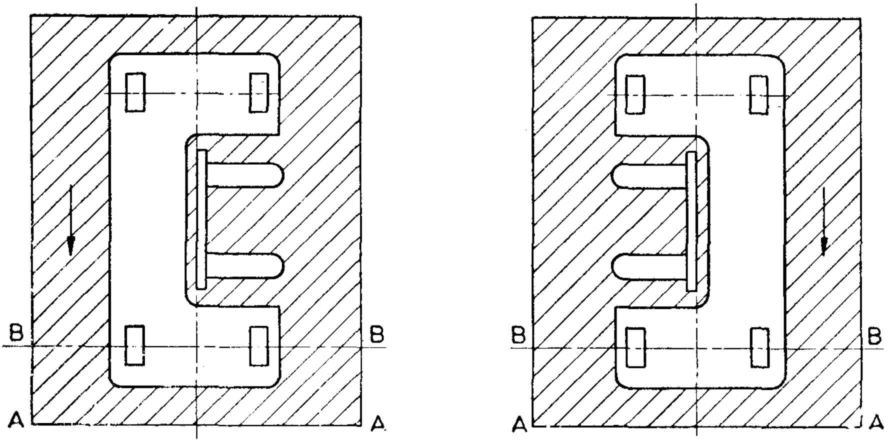

FIG. 6 POSITION OF TRUCK FOR TESTS S-5 AND S-6

4.1.8 The vertical position of the mast where prescribed shall be verified by means of a plumb line. For this purpose, attach the plumb line at the theoretical intersection of the front and top surfaces of the fork to establish a reference point. Any deviation caused by deflection when the load is raised shall be corrected by adjusting the tilt or the transverse position of the mast or forks within the limits imposed by the design of the truck. When attachments are fitted, the plumb line shall be attached to the underside of the carriage, attachment or load whichever is the lowest.

4.1.9 Where rearward tilt of mast is prescribed, in the case of trucks having tilting forks, the forks shall be set at a position which reduces stability.

4.1.10 Where tilt restrictions for various fork elevations are specified the truck shall be tested at elevations corresponding to each tilt value.

4.2 Test Requirements

4.2.1 In each of the tests the platform is tilted to a slope as prescribed in Table 1. The truck is considered stable if it passes all tests without overturning.

4.2.2 It is permissible for one or more wheels to lose contact with the platform provided the truck does not overturn at the prescribed inclination of the platform.

4.2.3 Where attachments are supplied as original equipment, the same stability tests shall apply.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 0·101 972 kgf
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2